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The Use of Electronic Flash in Medicine

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ELECTRONIC flash is perhaps the most important single reason for the high quality of present day medical records in both black-and-white and in colour. Many new applications of photography in medicine are based on this form of lighting.

The photographer is often faced with a combination of problems: his patients should not be troubled by heat and glare, but his photographs must be sharp and full of detail — however mobile, small and inaccessible the subject may be. A light source, such as electronic flash, which can be called upon again and again to radiate light of high intensity and of extremely short duration, is therefore invaluable for the daily routine of clinical recording. The patient is not inconvenienced, all motion is arrested, and the lens aperture can be small enough to obtain sufficient depth of field. Mains operated units of up to 1000 Joules are used in the studio. Mobile, battery fed power packs can supply sufficient energy to yield 200 Joules flashes in the ward, operating theatre and post-mortem room, without having to rely on the availability of local electricity supplies.

Cardew[1] has described the economic advantages in daily practice. It may here be of interest to survey the virtues of electronic flash in more specific applications.

Colour Photography:

The emission spectrum of flash discharge tubes is sufficiently near to daylight to make them suitable for use with colour film. Very consistent results can be obtained if lens aperture, distance from subject to light source, and the charge in the condensors are standardised. The latter is of some importance as the intensity and colour contents of each flash will then remain virtually unchanged, however old the tube may be. Each batch of film should be tested to determine the most appropriate correction filter. Colour transparencies may have to be copied to produce duplicates. Payne[2] has published a polished method of copying with electronic flash. The results are virtually indistinguishable from the originals in contrast and colour balance, and not infrequently a distinct improvement is achieved by adjusting the exposure and the filters. Exposure is very critical indeed, and a flash integrating meter[3,4] has been found most useful. This instrument will also give an accurate indication of exposure when "bounce" light (where the flash is directed at the ceiling) has to be used for the photography of rooms in the hospital.

Photography of the Eye:

The eye is a relatively small object and very sensitive to light. Winkelman

and Warmoltz[5] have described an electronic flash assembly which is particularly suitable. The reflection of the light source on the anterior segment of the eye should be small enough not to hide any detail, and the flash must be sufficiently intense and short to produce a colour picture with adequate depth of field before the patient has a chance to blink.

For much the same reasons electronic flash is now used in most cameras specially constructed for the recording of the retina. Jacobs and Ogle[6] use an Amglo 68R 9M which can be made to flash 30-50 times per second for focusing. Hansell and Beeson[7,8] have devised an ingenious tube, the British Thomson Houston FA5, which can be used as a continuous source for focusing and as a flash discharge tube for the photographic exposure. Prince[9] has since modified the circuit to vary the flash duration according to the pigmentation of the retina. The use of the Mazda TE23 tube has been described by Loiseblier[10].

Endoscopic Photography

It has always been difficult to obtain adequate illumination inside small cavities, such as the mouth. In practice it is almost impossible to place a lamp near enough to the optical axis not to cast shadows from the edge of the cavity into the field of interest. A circular flash tube which fits around the lens is a practical solution to this problem. Even deeper lying structures such as the cervix can be suitably illuminated and recorded by this method[11]. In 1952 Ganse[12] reported image magnifications of up to x12 with the Ihagee Kolpophot.

Even where an optical system has to be incorporated in the endoscope, as in laparoscopy, Calame[13] has described a seemingly safe and successful method of using special electronic flash tubes inside the abdomen to obtain records of the liver and gall bladder.

Photography in the Operating Theatre

Speed and asepsis are essential, and any form of heat on exposed tissues is always to be depreciated. Dostal[14] has listed a number of techniques and various types of apparatus, most of which now employ electronic flash for the above reasons. Mobile, hand held equipment will invaribly carry the flash tube as an integral part and is fed from a portable set. Where the camera is fixed to the theatre light or to a mobile stand mains operated equipment is often preferred. However, a note of warning should not be omitted Cardew[1], Breslin[15], Greppin[16], and Edridge[17] all point to the potential danger of causing an explosion. It is almost impossible to make such equipment guaranteed spark proof, and the only really safe method is to used inert anaesthetics which cannot constitute explosive mixtures.

High-Speed Photography:

Some biological phenomena, such as the vocal chords in phonation and blood flow, require a really fast rate of recording. A formidable literature exists, and the papers by Whelan[18] and Chesterman[19] are merely quoted as examples. Xenon flash tubes as stroboscopes can be synchronized with the high speed motion picture camera to produce 4000 f.p.s. with flashes of 4 Joules each and of 5 micro seconds duration.

Invisible Radiation:

Few workers realize that flash discharge tubes emit a quite considerable amount of Infra-red radiation. Where two large photoflood bulbs at 2′ from

the subject require an exposure of 1/10 sec. at f/8, two 200 Joules flashes at 3′ from the subject will permit an instantaneous exposure at f/11. Barstow[20] has reported on his investigation into the efficiency of electronic flash tubes in relation to their infra-red emission.

Although a certain amount of ultraviolet radiation is produced, this has not proved sufficient for the colour recording of fluorescent phenomena. It is hoped that manufacturers will produce special tubes with a much higher emission of the most suitable wave bands.

Photomacrography:

Where the negative image is an enlargement of the original, even the smallest movement is also magnified. An automatic focussing and exposing camera for photomacrography of the skin[21] would be unthinkable without the use of electronic flash. Even specimen photography, where the image in the camera is usually smaller than the original, flash tubes have proved most useful when the specimen has to be hand held.

Photomicrography:

Here the optical magnification is higher still, so that any movement is relatively greater and depth of field is reduced to negligible proportions. The recording of living material is thus impossible without short duration illumination of high intensity. Conrath[22] and Illig have described their use of a special 200 Joules tube of 1/3000 second flash duration for the photography of the smallest blood vessels in the mesentry and pancreas of living mammals. Byrom[23] has accomplished similar work on a minute area of the brain in anaesthetised rats. In Great Britain similar work[24] has been published in the Journal of Photographic Science. Changes in the capillary pattern of the nail bed in human subjects have been studied by Herruring[25] who uses flash illumination not only to overcome movement, but also to avoid any possible influence on the temperature of the tissues.

Cinemicrography:

High speed flashes have been used by Laporte[26] to film fast moving organisms with ordinary and phase contrast microscopy. At the other end of the time scale, in time lapse kinemicrography, Traber[27] found that, with 200-400 Joules a high shutter speed and a small shutter segment, motion was arrested, depth of field was sufficiently great, and no additional heat affected his experiments.

Darkroom Work:

Enlarging with electronic flash[28] as light source may seem far fetched. It may nevertheless prove the only practical solution on board a hospital ship or other similarly unstable location.

Consulting Room Photography:

This survey would not be complete without a consideration of the physician or surgeon who wishes to take his own records. Andrews[29] has published a description of an arrangement which should prove suitable for the doctor to whom the camera is merely one more instrument in his consulting room. Electronic flash has been incorporated because of its constant light output, its speed, and absence of glare and heat.

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For Your Information: Panelescent Lamp. J. J. Reidy, *Nat. Press Photographer*, **12:** 10, February, 1957. Sylvania Electric Products Incorporated has developed a darkroom safelight, the Panelescent Lamp, to be used with filters suitable for the material to be handled. The new lamp operates without a filament, bulb, vacuum, gas discharge, or tube. It consists of a thin sheet of a dielectric material containing a special fluorescent powder sandwiched between two conducting sheets, at least one of which is transparent. The lamp operates only on alternating current, and its brightness depends on the voltage and frequency of the electric field applied across the dielectric prosphor layer. The conducting sheets are made of enameled steel, coated with a ceramic-phosphor layer. Lamps so constructed are only 0.25 in. thick. Since the lamp is made of thin material, it can be mounted flush with the surface of the darkroom walls or ceiling. The lamp can also be employed as a light source in a contact printer. No diagram or photograph of the lamp is reproduced in the article. K.G.

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Copying Radiographs for Lantern Slides, Prints and Display Transparencies

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IN teaching institutions a considerable amount of time and effort are spent by medical photographers copying radiographs. Due to the tremendous range of brightness encountered, often a ratio of 1000 to 1, in many radiographs, it is no easy assignment. How can it best be done on a production basis and still allow time for other varied photographic duties? Equipment need not be elaborate and may be used for many other purposes.

Of first importance is a suitable 14 x 17 inch illuminator, or shadow box. The modern x-ray illuminator, containing fluorescent tubes, was designed for viewing radiographs and for that purpose is very efficient, but the light level is too bright to make it a good source of light for copying. Short exposures of a fraction of a second would often be indicated. The illuminator shown in Figure 1 is now obsolete but is very efficient as a copy source of light. Many of them are used in x-ray departments throughout the country and it should not be too difficult to locate one of these boxes. A sheet metal worker, however, could alter a modern one to the measurements given. The inner surfaces are white enameled. One 100 watt bulb will furnish all the light that is needed. The distance of 15 inches from the lamp to the 14 x 17 inch opal glass insures even illumination without hot spots.

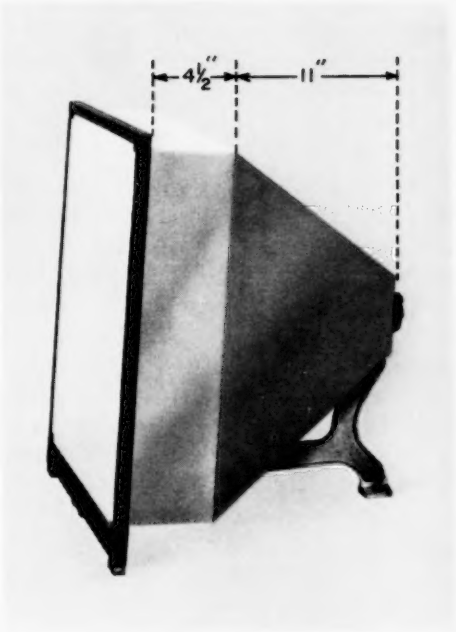

Fig. 1. Illuminator.

This low level of illumination calls for a range of exposure from 5 seconds for a thin or underexposed radiograph, to 30 seconds for a dense one. With this long exposure range a slight error in calculation is hardly noticeable, whereas if a high level of light is used and exposures are based on a fraction of a second, a slight error may result in a retake.

In the early days of the Biological Photographic Association the membership recommended the 5 x 7 camera with its long bellows draw and the 5 x 7 film as the size best suited for general clinical photography. In spite of the trend toward smaller cameras, and films ranging down to the size of postage stamps, those recommendations still hold today.

The production of satisfactory prints for publication from miniature films, with their processing problems, calls for projection printing which is more difficult and certainly more time-consuming than contact printing from a 5 x 7 film.

Figure 2 shows an easily made vertical copy stand. The 5 x 7 view camera is attached to a counterweighted traveling carriage above the illuminator. The apparatus uses very little floor space and masking the films of different sizes is quickly accomplished without the use of masking tape. A barrel type enlarger lens of not more than 7½ inches focal length with f stops visible on the rim is shown. Exposures are made with an electrical timer connected to the illuminator. Disposing of a shutter eliminates vibration that may be transmitted through a cable release.

The film best suited for copying radiographs, hereafter referred to as the intermediate film, is one selected for its great range of tones. One most satisfactory for this purpose is Kodak S. S. Ortho Portrait Film.

To reduce or compress the range of tones encountered in the radiograph to be copied, this intermediate film is deliberately overexposed and processed by the deep tank, time and temperature control method, to one-half its normal development time. However, when extremes in contrasts are encountered, for example, a lateral film including the dorsal and lumbar spine, slight pre-fogging of the intermediate in the dark room will further reduce this contrast range.

With this technique a 5 x 7 intermediate film is produced that may be used for a number of purposes: Lantern slides, contact prints for publication, enlarged prints for exhibits, or contact and enlarged transparencies for display.

Lantern slides are made by reduction. A 3¼ x 4 inch reducing back is attached to the camera. Requests are frequently received for a slide showing one or more x-ray films. After cropping the intermediate films to show just the area of interest, they are arranged on the illuminator, held flat by a sheet of plate

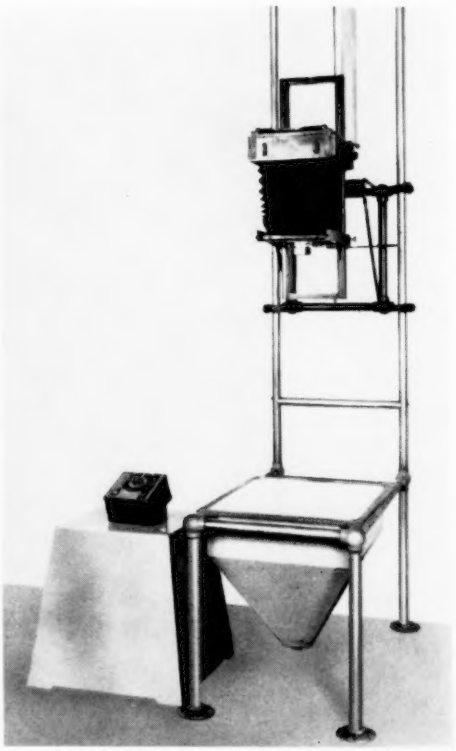

Fig. 2. Copy Stand.

glass, and masked to exclude extraneous light. The medium slide plate is preferred because of its greater range of tones. By this method slides are made with greater ease and speed than is possible with an enlarger which must be used in the dark room.

For processing, slides are placed in hangers and tank developed. This method is preferred to tray development when a number of slides are processed at one time. Farmer's solution is very useful in local reduction of areas or very slight over-all reduction to increase brightness.

The most difficult part of copying radiographs is making a paper print suitable for publication. The 5 x 7 intermediate film technique described has compressed the contrast scale to probably 200 to 1. Since the softest grade of paper has a maximum tone range of not more than 50 to 1, a straight contact print will seldom do it. Some form of dodging must be used.

The contact printer should be constructed so as to allow about 4½ inches of space between the printing surface and the ground glass diffusing screen above the light source. Plate glass sheets are inserted in slots at various levels to hold dodging materials. A variety of dodging materials is useful, such as bond paper or tissue paper with grease pencil or lipstick applied to areas to hold back light. Sections may be cut out of the paper to admit more light.

For the past 10 years all contact prints in this laboratory have been made on Varigam Variable Contrast paper. An Eastman Professional Printer, Model 2, has been modified by installing an Urban Striated Variable Filter near the light source. A control knob marked with divisions from 1 to 10 allows for a change in degree of contrast from very soft to very hard. It is possible to make very satisfactory prints with this combination of dodging materials, Varigam paper and variable contrast filter.

When a request for transparencies for display purposes is received, a film having quite a range in latitude and contrast is needed. The Graphic Arts Films are not suitable because of excessive contrast. Kodak Fine Grain Positive Film in several sizes is available and will give very satisfactory results by contact printing or enlarging. A great latitude of tones and contrasts can be achieved by varying the exposure and developing time, also by using a soft or high contrast developer. This film can be handled in the dark room under the same conditions which are safe for bromide paper.

Summary

A method of copying radiographs has been described stressing the use of an x-ray illuminator with a single incandescent lamp; the view camera mounted on a vertical stand; the 5 x 7 film size for the intermediate; making lantern slides by reduction; the advantages of Varigam paper and variable contrast filter for contact printing, and the versatility of Kodak Fine Grain Positive Film for display transparencies.

Photography of Selected Gross Pathologic Specimens Under Fluid*

A Discussion of the Merits of a Photographic Technique

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THE photographing of gross pathologic specimens under fluid is not new in theory or in technique. Available literature indicates that Wilson and Andrews[1] of the Mayo Clinic employed this procedure for stereo-photography in about 1905. Other workers have used this process, but very little seems to have been written concerning it.

In our institution, the revival of this technique was brought about by a request from our pathologists to photograph a urinary bladder (Fig. 1) containing a papillary carcinoma. By routine visualization the pathologic details were lost, but under fluid the papillary effect was demonstrated acutely. Since this experiment, we have photographed several types of gross specimens under fluid, and it is the opinion of our pathologists that the pathologic changes and anatomical structures of selected specimens are demonstrated advantageously by using this photographic procedure. We have found this process valuable for specimens of the papillary or villous type, or for any gross pathologic specimens deserving the reproduction of minute details (Fig. 2).

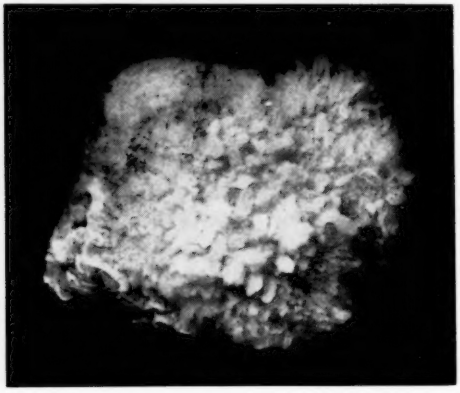

Figure 1. Urinary bladder — papillary carcinoma. Under fluid visualization.

Technique

1. The specimen to be photographed is washed to remove mucous and blood.
2. Lead weights are sutured to the bottom side of the specimen.
3. The specimen is placed on a card selected for the background.
4. The card containing the specimen is placed in a tray.
5. Fluid (98° F.) is poured slowly into the tray until the specimen is covered completely.

*Presented before the Biological Photographic Association, Annual Meeting, Rochester, New York, August 29, 1956.

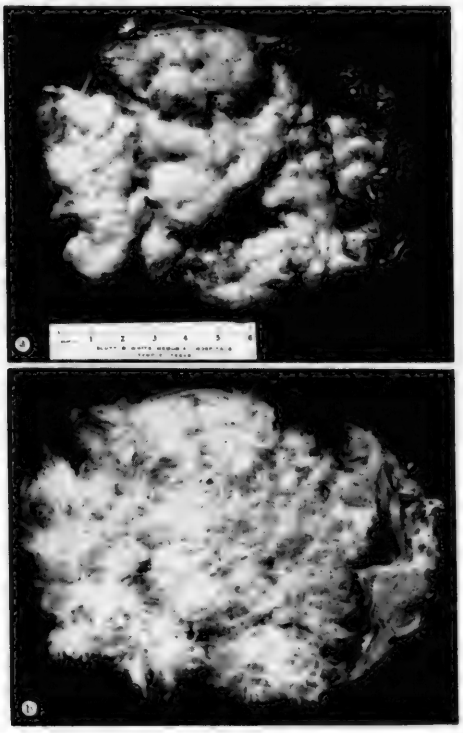

Figure 2. Placenta.

(a) Placenta appears as firm mass.
b) Under fluid, villious projections shown; softness of placenta demonstrated.

Exposures are determined in the usual manner.

Comments

By photographing selected pathologic specimens under fluid:

1. Some color loss is apparent.
2. Edema will occur if the specimen remains in the fluid for too long a period.
3. Histologic changes have not been observed.
4. Suggested fluids have been kerosene, mineral oil, and saline. We have used plain water in our experiments.

* * *

I wish to express my thanks to Dr. A. C. Broders, Sr., Dr. Charles Phillips, and Dr. J. C. Stinson of the Department of Surgical Pathology and Pathologic Anatomy of the Scott and White Clinic, and to my wife and associate Mrs. Rosalie Winburne of the Department of Medical Photography. Without their assistance this discussion would not have been possible.

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Camera Movements. D. Charles. *Brit. J. Phot.*, **104:** 130-32, 138, March 8, 1957. The types of camera movements usually fitted to the traditional design of "stand" or technical cameras are described. Some less commonly known applications of these movements are discussed. R.S.B.

Color X-Ray Images and Enhanced Contrast

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IT is possible to take color x-ray pictures and, because of the added degrees of freedom, they can display much information about a subject and reveal otherwise unnoticeable detail. Besides the larger number of possibilities for differentiation giving a more detailed field, the eye's great sensitivity to hue is brought into play. The same general principle also applies to infrared and utraviolet rays. One can also suggest principles of color fluoroscopy and x-ray color film. In connection with these a process is discussed that is specific for a single chosen element. All the processes are quite obvious, once noted, though some of the details of procedure are rather subtle. Because of this last fact, the process which was first described in 1949,[1] has only recently been acceptable.[2]

One sees color, or takes color pictures, by noting a response of receptors, or monochrome films, to several wave-length ranges or distributions (*cf.* tri-stimulus colors). A given combination of relative intensities yields color. Rather than conditioning or filtering the receptors, one can modify the incident radiation (the illumination) upon one detector between successive observations. Similarily, to take a color x-ray picture one makes three ordinary monochrome pictures, each time using a different wave-length distribution of the x-rays incident on the subject. The resulting three black-and-white pictures can be combined into a single color picture by the usual processes of making a color print from three "separation negatives" or by superposition of their three images projected on a screen, each of the three projectors having one of the primary color filters over its lens. Materials having differing absorptions in different x-ray energy ranges will come out in different hues, even though the over-all absorption in one ordinary radiogram may be the same (*i.e.* the relative shades of grey differ in the different negatives to give different colors to dissimilar items). In principle this system actually has some of the properties of a mass spectrograph. The result is a true color translation picture.

One can alternatively consider the above color prints as merely a convenient method of simultaneous display of the three types of information, *i.e.* the relative absorptions of a material in three different wave-length distributions. However, this is all that color vision, itself, accomplishes. In terms of evolution, it seems reasonable that an ancestor who could see, as distinct from each other, a brown dinosaur in a green thicket

would survive, whereas, a relative that saw them simply as similar greys would be gobbled up. Likewise, the comparison between an ordinary x-ray picture and those of the type under discussion is like comparing the effectiveness of a normal person with one who is totally color blind. The possible metallurgical, medical, and industrial applications are obvious.

The fact that the first step in the process is in black-and-white makes it no different from any other color process. All color films, and color television, utilize a monochrome intermediate step. Color vision itself involves several similar carriers of the several types of information ("brain signals are not colored"). If we could see x-rays, as we see visible light, these pictures would show what we might see. Similarly, any wavelength range may be expanded or compressed and translated into the visible region by this process. Thus, one can produce color pictures utilizing the properties of ultraviolet or infrared rays and visible light.

The first experiments that gave reasonable results made use of an experimental x-ray tube in which the anode material could be changed by rotation through a Wilson seal.[3] Pictures were made using anodes of silver, molybdenum, and iron at 80, 60 and 40 kilovolts respectively. Different regions came out in different hues but the colors were still somewhat muddy, apparently due to the exposure produced by the similar distribution tails of the background radiation in the three cases. The condition is aggravated if the voltage source is unfiltered.

The next refinement in the process was the use of a long wavelength negative to mask a positive of the next shorter wavelength exposure. The tails on the two x-ray distributions had similar shapes and tended to subtract or cancel, thus leaving effective that narrow part of the continuous radiation between their upper energy limits. This masking process seems very promising, especially in more sophisticated forms. It may even allow the use of ordinary x-ray tubes with only variation of the voltage.

The above process should not be confused with a *colored* x-ray picture. One can effectively paint a picture that will be good for instruction and display by treating a single x-ray picture with dyes, suitably painted in by hand (*e.g.* by the Flexichrome process). Since the absorptions for many substances are not always very dramatic in the x-ray range, this coloring method may actually yield more vivid pictures, but it does not help define otherwise unobservable detail and should not be confused with the color translation process which automatically includes more information than a normal single wavelength picture.

It is fairly clear what one must do to produce direct-viewing color fluoroscopy. One might employ a thick (to x-rays) fluorescent screen so that different energies would activate different depths, each glowing a different primary color. Actually, one might have the fluors respond not to the x-rays but to their photoelectrons, whose velocity is an increasing function of the x-ray energy. A single continuum of x-ray wavelengths would be incident in the above method. As an alternative, one might consider cyclically altering the x-ray composition (by gating the accelerating voltage up and down; using rotating filters; or, possibly, with a three-material rotating-anode tube) and scanning the subject with an electrical x-ray detector. The output could then be fed to a color television receiver. In all cases it would seem desirable to be able to alter the x-ray composition

continuously, while watching the result, in order to emphasize particular details of interest. This is difficult, even in principle, and possibly the only way to accomplish this result is to use a standard source and modify the properties of the detector. For example, one might consider using either a retarding field or a magnetic velocity selector on the secondary electrons produced in a detector, thus altering "what the detector sees" and displays. One might also consider selecting velocities with velocity-sensitive intensification by thin films of matter. Part of this latter effect is due to the increase in ionization as a particle approaches the end of its range.[4] Such films might be continuously adjusted (*e.g.* by stretching) or three fixed thicknesses might be employed if adjustment while observing was not needed. It should be noted that such an adjustment is more fundamental than, and not equivalent to, taking three fixed illuminants and varying the values of the visible colors used to represent them (*e.g.* with the help of a variable thickness interference filter). A scintillation detector and pulse height analyzer provide a direct solution. These methods can also discriminate against scatter if a monochromatic input beam is employed.

Related to the previous question is that of x-ray color film (Obviously, "if a color" image is available, it can be photographed with ordinary color film in color). One might consider a three-layer film with filters between layers, but a two-dimensional matrix using velocity sensitive filters for the secondary electrons seems promising (*i.e.* the analog of Dufaycolor). The presently available high-speed x-ray movie techniques allow sufficiently rapid film change to permit color x-ray movies, and a recently discussed process[5] allows the making of three-dimensional movies without duplicating equipment or film.

In practice, for immediate use or permanent filing, there is never a need to make a color print. One can store and use the three monochromes. They can be viewed in full color, at any time, with the help of a viewer consisting of a suitable triple projector. In fact, if a color transparency is wanted, the easiest preparation method is to photograph such a projected color image from a white surface using standard color film. Since the range of a transparency can always be higher than that of a print, one should never make one of the former by photographing a print.

There is another related process that is specific for a particular chosen element. This process displays information about one element in monochrome form (a display concerning one element is quite properly presented in monochrome), but obtains the information by subtracting data obtained from observations at two wavelengths. Complete information about one selected element requires observation of its absorption in only two, rather than three, wavelength distributions, and these two can best be monochromatic wavelengths chosen from figure 1. If one has a special interest in a particular element (*e.g.* an iodine tracer used to outline a body cavity) one can obtain more sensitivity and contrast by employing this method. A typical plot of mass absorption coefficient as a function of wavelength is shown. For element A the K edge (the "discontinuity" at which a substance suddenly becomes less transparent because the energy of the incident rays then becomes sufficient to knock out a K electron) is included. Other elements have their absorption edges placed differently on the frequency scale. If one now views a region

of the specimen (either during a scanning process, or all at once by photographic means), first by λ_1 and then by λ_2, it can be seen that the presence of element A will yield a change in output while the presence of element B will cause little change due to this small alteration in frequency (In the present case, unlike the colored picture case, the radiation must be approximately monochromatic to be effective). One must thus subtract outgoing intensities in corresponding points of images made by λ_1 and by λ_2. If the images consist of two photographs, superimposing a negative of No. 1 on a positive of No. 2 will yield a result that is mostly a function of the presence of element A alone. Jacobson[6] has independently demonstrated the effect in a superior manner while using the great sensitivity of a photomultiplier as a detector. In this method the subject is alternately irradiated by λ_1 and a λ_2 from rotating secondary emitters (fluorescent radiation) and the a.c. component of the signal from the detector then depends on the amount of the one element.

Another method worthy of consideration would be to isolate the characteristic radiation from the tube by reflection from suitably oriented crystals, whose reflection can be almost 100 percent efficient. One can effectively isolate a single wavelength by using Ross balanced-foil filters[7]. As a pair of such filters is rotated, either before the tube or before the detector (the former tends to minimize radiation of the subject), the difference signal is a function of the presence of one wavelength only if the thicknesses of the filters have been suitably adjusted. This is because the absorption curves everywhere match and subtract to zero, except at the K edge which is somewhat displaced for the two elements composing the filters.

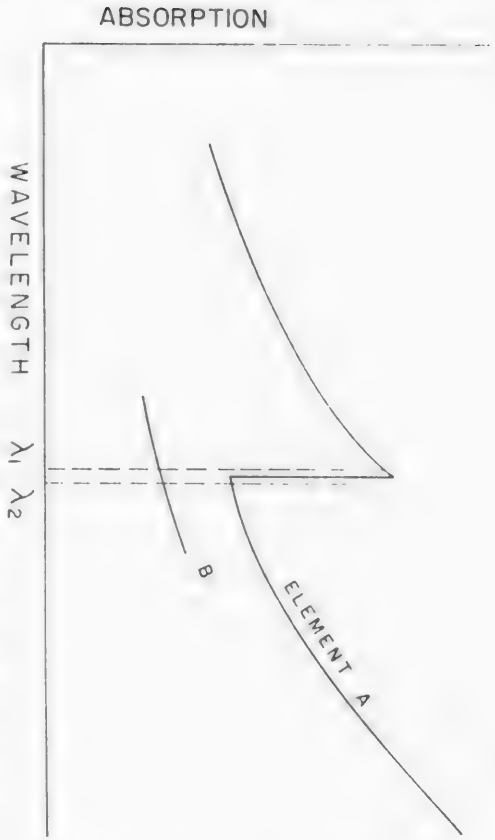

Figure 1. Representation of a process in which one alternately observes a body by x-rays of frequency slightly higher and lower than the characteristic absorption of one chosen element. The difference in the intensities in the two cases is essentially a direct measure of the one element alone. If element B has a constant thickness (e.g., in studying a welding process, this might be the base metal) then the small change in going from λ_1 to λ_2, due to this material, can be completely compensated.

Possibly a rotating triple filter involving iodine and the elements in the Periodic Table on each side of it would be best for searching for iodine in a subject. Then, if iodine is present in a given region of the subject, the change from an iodine filter would make much more difference in going to the lighter filter

than to the heavier one, while the filters could be adjusted to give an equal change in the absence of iodine in the specimen. Another method that has been suggested for implementing this process[1] is to gate the voltage applied to the x-ray tube up and down through a small range. The tails of the radiation distributions would then tend to subtract or cancel out at the two voltage levels, leaving effective just the small region between the high energy cut-off points; but the system would probably not be very effective. It might be noted that the Ross filters might be used in connection with a photographic process in which subtraction would later be accomplished by some form of masking.

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Method of Copyboard Illumination. C. W. Whitaker. *Brit. J. Phot.*, **104:** 73, Feb. 8, 1957.
A cheap and simple method is described for constructing a bank of high-power lamps to illuminate very large copy strongly and evenly. The same technique, using a metal angle strip, cement, etc., can be used to construct a rigid camera stand. R.S.B.

Journal of the Biological Photographic Association Vol. 25, No. 3 August, 1957

Reflex Attachment for Difficult Angle Operating Room Photography

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PHOTOGRAPHY in the operating room is often extremely difficult because of the unusual angles in which the camera must be positioned in order to demonstrate properly the anatomical relationships of the organs in the field that is to be photographed. The author has devised a reflex camera attachment which has eliminated some of the difficulties encountered by the photographer in the operating room.

Description of the Reflex Camera Attachment

Reference to Figures 1, 2, and 3 shows the attachment to consist of an adjustable mirror held by two aluminum arms which are fastened to the camera by a knurled screw on each side. The mirror backing was also cut from aluminum. The mirror* should be externally coated (first surface type) to eliminate ghost images. The actual dimensions of the mirror and parts are dependent on the camera and lens used, as well as the image size desired. It is important that the arms of the attachment plus the camera overhang will be of sufficient length to place the mirror directly over the center of the field to be photographed.

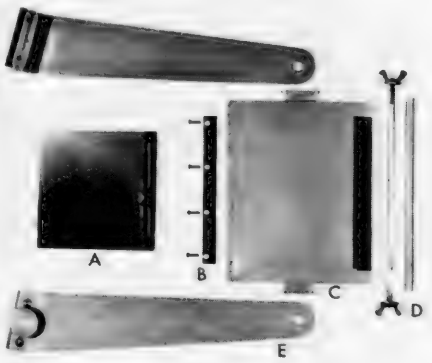

Figure 2. Reflex attachment disassembled for demonstration of various parts: "A" first surface mirror, "B" mirror clamps, "C" mirror back, "D" fastening bolt and sleeve, and "E" arms with fastening screws.

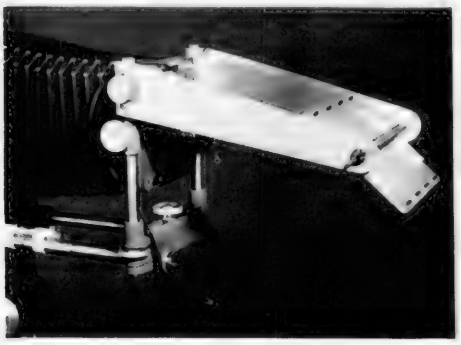

Figure 1. Lateral view of assembled attachment on camera.

*May be purchased from Edmund Scientific Corp., Barrington, N.J.

Figure 3. Underview of attachment.

Use of the Attachment

The light source generally used is a flash gun directed downward equidistant between the lens and the mirror (Fig. 4). In this manner it is possible to illuminate the operative field with practically no shadows. It must be remembered that the mirror reverses the image on the film. The negative or transparency should be reversed when printed or projected. It is desirable that the lens used is of sufficient focal length to produce a telephoto effect and thus the camera can be placed at a convenient distance from the field.

To minimize the adjustments required in the operating room, the image size desired is preselected by determining the proper lens to film distance. Thus, focusing of the image can be accomplished simply by raising or lowering the camera.

The reflex camera attachment has also been found useful for photographing babies without the necessity of removing them from the bassinet.

Figure 4. Camera and reflex attachment in position over surgical field.

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A Concept of Medical Illustration

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THIS paper is the result of an exploration of the question, What is medical illustration? Because of my personal curiosity, I have discussed this subject with others in the field of medical illustration: with physicians, psychologists, and educators: and with persons from a number of other fields who, in one way or another, have interests similar to ours. Developing, collecting, and organizing these ideas has helped me achieve a better understanding of my work and its relation to medicine. I hope you will find the following of some practical value.

The paper is organized into five sections, in the following order:

(1) A *definition* of the terms that will be used *and* a *statement of* the *purpose* of medical illustration.

(2) A *description of medicine* as experienced by the illustrator.

(3) A way of viewing *communication in medicine.*

(4) A description of *the audio-visual communication process.*

(5) A *conclusion* consisting of several *recommendations* submitted for your consideration as we plan for the future.

We should recognize that in the time available it will be possible to do no more than discuss each of the five divisions briefly, and we may examine only the gross structure of medical illustration. This over-all structure, however, we need to keep in mind, because any detail of medical illustration is understandable only in relation to the total. For example, the hand is meaningless unless one is familiar with the total anatomy of man and the way he lives. With this kind of an understanding each part of the hand has significance, for we can relate these parts to man's needs. They represent a necessary development in man's relationship with his environment.

I propose that we look at our work in this way and begin with an examination of medicine. An understanding of this, our environment, should enable us to conceive of the direction that medical illustration may take in the future.

Our first step must be a definition of the words and terms to be used, a statement of the purpose of our work, and an agreement about our relationship with medicine. The basis for the concept that I will present is contained in the next four statements.

(1) Medical illustration pertains to various audio-visual techniques required by medical treatment, education, and research, and includes photography, art, and electronics (such as TV and sound recording).

(2) Medical requirements for illustrations are based upon needs for communication. The illustration therefore is never an objective of the medical staff it is a means of attaining an objective.

(3) The illustrator enters into a form of a partnership with the physician for

the purpose of communicating medical information, and their relationship is the result of the physician's need for communication services.

(4) Effective communication by audio-visual methods is the result of a series of coordinated activities, each requiring considerable skill and knowledge.

With a definition of terms and an understanding of our relation to medicine, let us now describe medicine as we experience it. We recognize it as the science and art which deal with the prevention, cure, or alleviation of illness.

We can visualize medical practice as organized around illness, completely encompassing it, constantly striving to reduce the effect illness has upon people. We have all witnessed part of this struggle. With the development of new preventive and treatment methods, illness occurs less often and when it does strike, treatment is faster and more effective than it would have been just 10 or 20 years ago, (figure 1).

The increase in the amount of medical knowledge has made necessary the division of medicine into a number of parts, (figure 2). Here we see medical practice divided into 25 areas of specialization such as one might find in a hospital. Dentistry has been included in the division because it may use hospital facilities. My only reason for showing this arrangement of medical specialties is to emphasize the totality and complexity of medical practice.

Since we are limiting ourselves to the consideration of gross structure, we will not examine each of the divisions of specialization. Instead, we will move on to the next illustration which is an ex

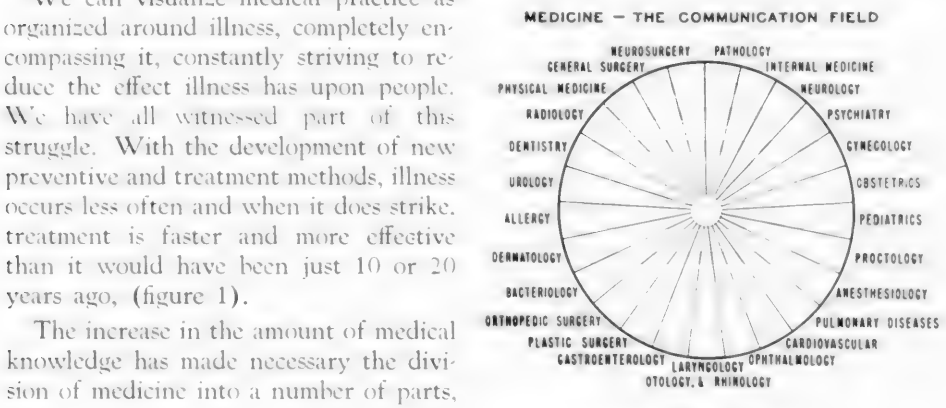

Figure 2.

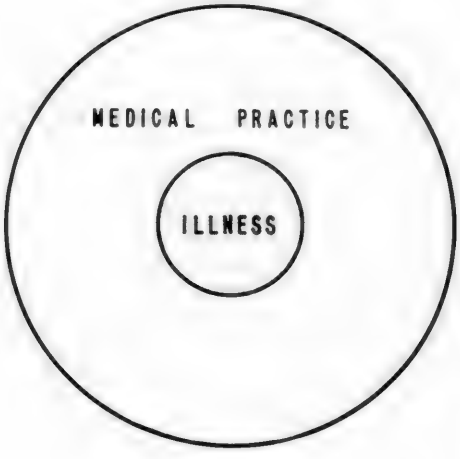

Figure 1.

tension of the preceding diagram and shows the areas of specialization divided into five parts, (figure 3).

The divisions of specialization into Research, Professional Education, Treatment, Patient Care, and Administration, are believed to be self-explanatory. We are aware that individuals on the staff may function in several of the areas. The division is intended to show ways individuals may function rather than organizational divisions of personnel.

The center of the diagram previously identified as illness represents the point where all activities converge to accomplish the mission of the hospital. The

MEDICINE — THE COMMUNICATION FIELD

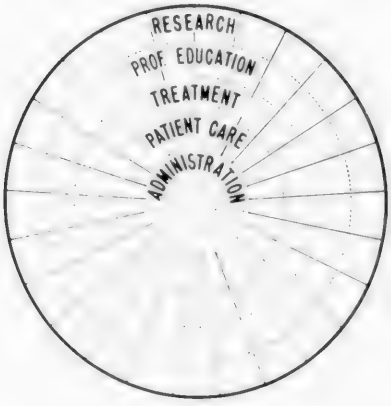

Figure 3.

diagram quite properly has the appearance of a target with the center representing the hospital objective.

The number of major work possibilities represented is 125, and each division can be sub-divided a number of times as we all know. Obviously no one illustrator or group will cover the total field. Medical illustration services usually concentrate upon small areas. The nature of the hospital will have considerable effect upon the place of concentration, but this is not the only factor. The services may be limited by our lack of knowledge and our inability to acquaint the staff with the potentials of medical illustration rather than by a lack of a need for our services.

The preceding diagram shows the many possibilities for illustrations which may exist in a hospital. This diagram may be adapted to show choice and emphasis for medical illustration. Here is the medical communication field as I experience it, (figure 4). Instead of 25 medical specialities we now see only 9, and the 125 possible areas of work have been reduced to 45 actual work areas.

If we take one more step, we see the amount of service given to each of the nine specialties, (figure 5). Psychiatry makes approximately 1/3 of the demands for medical illustration services. Of this amount it will be noted that most of the requests are from the division previously identified as "Education" and that the next largest area for the illustrator is "Research". By contrast we see that the area identified as "Administration" requires very little of medical illustration.

We have seen two medical fields diagrammed—one suggesting the complex totality—the way we must view medicine as a group—the other diagram represents medicine as experienced by one individ-

THE COMMUNICATION FIELD - TOPEKA V.A. HOSPITAL

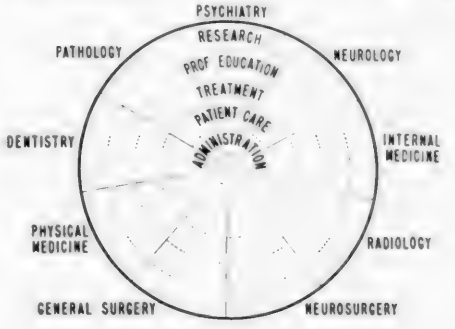

Figure 4.

COMPARATIVE AMOUNTS OF SERVICE WITHIN THE FIELD

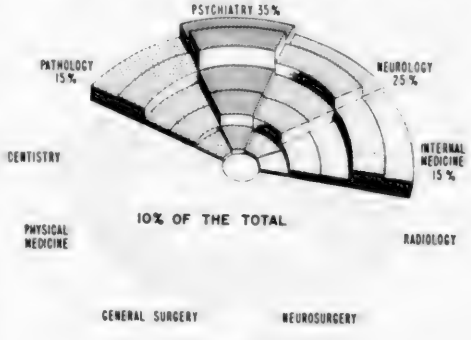

Figure 5.

ual. I feel quite certain that if each of you made a diagram of medicine as you experience it, no two diagrams would be alike. Only as a group can we show a totality of service to medicine. This has interesting implications as we consider both educational needs and standards for medical photographers. For example, *how much* of *what kind* of knowledge should be considered as a minimum requirement for a medical photographer? On one point we are in agreement, he should have an extensive knowledge of photography. We also agree that he should have a knowledge of medicine, the place where he works. When we each consider our individual medical field and note the differences and then look at the magnitude of the total medical field we certainly begin to have an idea of why it is difficult to determine how much and what kind of medical knowledge the illustrator should possess. I ask you to take particular note of the fact that we place considerable emphasis upon *what* the illustrator does and *where* he does it. It is my belief that we do not give sufficient emphasis to the "why" of medical illustration and that lack of attention to *WHY* can reduce the medical value of our work. I believe it is possible to understand the role of the medical illustrator only when his work is viewed against the background of purpose. Without purpose clearly in focus in the background his work is meaningless. To me this is of great importance and represents an aspect of medical illustration that warrants considerable attention.

In the introduction it was stated that our work is the result of the need of the medical profession for audio-visual communication. It was pointed out that the illustration is not an objective but instead, must be viewed as a means of reaching an objective. Let us examine the "why" of medical illustration by continuing our examination of the medical field.

This brings us to the third point of the introductory outline, and was referred to as a way of viewing communication in medicine.

In my original draft of the paper considerable attention was given to a theoretical development of the communication process, based upon the diagram of the communication field, (figure 6). The areas were described as representing different kinds of knowledge separated by the lines which were referred to as boundaries. It was brought out that these boundaries may become barriers obstructing the flow of information between the areas shown on the diagram. My whole purpose of the original lengthy discussion of this point was to establish the concept of boundary lines which can become barriers. The detailed description was a departure from a gross examination of medical illustration and for that reason was deleted.

With only this brief description of boundaries in the communication field I ask you to think of each line as a po-

MEDICINE — THE COMMUNICATION FIELD

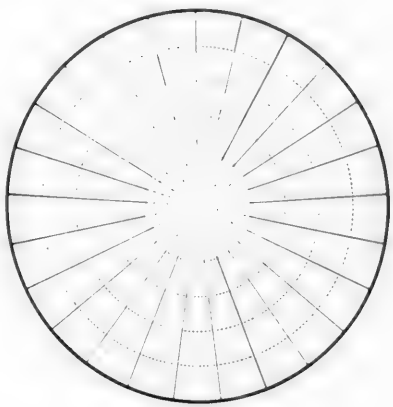

Figure 6.

tential barrier to communication between the areas shown on the diagram. In this concept audio-visual methods of communication are thought of as bridges designed to overcome barriers which obstruct the flow of information. Let us examine the process of communication by audio-visual methods and identify each step of the sequence of events which occur whenever our services are used, (figure 7).

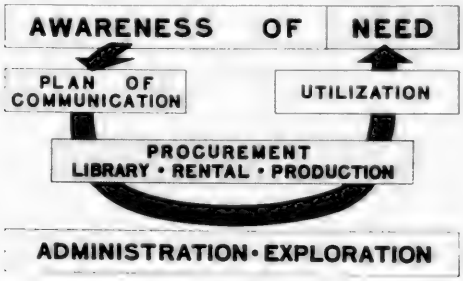

Figure 7.

1. The first step is *awareness* of the need to communicate which may originate with any individual or group. If the illustrator keeps informed of hospital programs he may identify the need, and it is natural and logical that he should.

2. After recognition of the needs, a *plan of communication* is developed. Some needs are so simple or so well supported by precedent that a plan occurs spontaneously with the recognition of need. Other situations require very careful and thorough preparation. We naturally hope that plans for medical illustration result from the use of all available knowledge of both subject matter and communication methods.

3. The planning done, it is now necessary to *procure* the audio-visual material decided upon. There are three procurement sources.

(a) *A library of audio-visual material* which may be no more than the slide box owned by the physician, or it may be a comprehensive cross-indexed depository available to all hospital staff.

(b) *Rental or loan.* The physician has some information about audio-visual material available from other sources. He may remember a film he has seen at a medical convention or a collection of slides owned by a colleague; he may keep a list of films; or he may have access to an organized source of information within the hospital.

(c) *Production* may be limited to the physician's ability to make a chart or take a picture, or he may have the benefit of medical photographers and artists.

4. Next we come to *utilization*, the point where ideas are communicated to others. The physician's knowledge of using audio-visual materials may be based upon his personal experiences and his own equipment, or he may have available equipment owned by the hospital and professional guidance by medical illustrators.

There are two other factors in every communication process that we are interested in — *administration* and *exploration*.

5. *Administration* is the organization and direction of the audio-visual resources. It may be necessary for each individual on the staff to perform these duties if he wishes to use audio-visual techniques, or this service may be another resource available to him.

6. *Exploration* is the constant pursuit of better audio-visual communication methods. How well medical illustration services are organized determines whether the results of exploration become hospital or individual knowledge.

It is my belief that each of the steps outlined occur in every audio-visual com-

munication process. Although some steps may not be our responsibility or may be given little consideration, they still exist. The mere fact that we are aware of this sequence of events is an acknowledgment of the presence of each step. I believe it is important for us to keep this sequence in mind constantly, and to contribute in whatever way may be necessary to assure that each step is given sufficient consideration.

Let us review this process by visualizing and arranging the various aspects of audio-visual communication to provide maximum benefit to medicine.

Let us say that *research*, (figure 8), activities have developed a new treatment method which is believed ready for introduction to practicing physicians. At this point all the knowledge about the new method is possessed by Research. To put the method in practice it is necessary to acquaint *physicians* with the new procedure, create in them a desire to use it, and provide them with the information necessary for proper application to patients, (figure 9). Until this communication is accomplished there is a *barrier* between research and the physicians. The barrier is visualized as a ravine, (figure 10). If the new method is an extension or improvement upon known and tested procedures, the barrier can be overcome easily. If it requires a completely new attitude toward the illness and treatment, we may find a barrier that requires considerable effort to overcome.

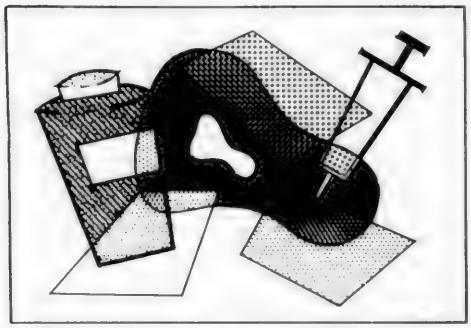

Figure 8.

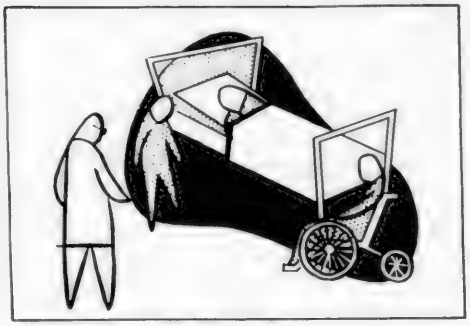

Figure 9.

The *barrier* or obstruction has been recognized and it is agreed that a problem of communication is to be solved. In this example the nature of the subject matter suggests that the most effective method of bridging the barrier is by audio-visual methods.

A *plan*, (figure 11), is developed which can be compared to the engineer's blue print. The plan for a communication bridge is based upon objective, information to be communicated, and the resources that are available.

A vital part of the plan is the *bridge*

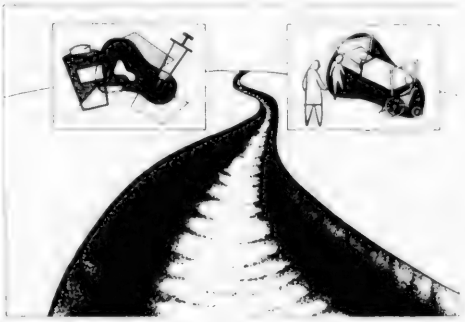

Figure 10.

Figure 11.

supports, (figure 12). One support is the ability to select and organize pertinent information. The other support is a knowledge of the requirements for effective utilization.

The *communication bridge,* (figure 13), is erected on these supports and is visualized as being circular — like a tube or pipe. The walls of the tube provide a sheath which directs the ideas and holds them together.

Now let us consider the construction of the bridge itself. A *cross-sectional view,* (figure 14), provides us with the best opportunity to examine the structure. The wall is divided into 4 major areas: Photography, Art, Electronics, and Words. Each area has been extended one step. Thus still and cinema are the divisions of Photography: Art is divided into two and three dimensional types such as illustrations and models: Electronics is divided into TV and sound recording, and Words are considered as text and narration. Further extensions could reveal all the known audio-visual communication forms.

If we adapt this concept to a specific situation we may find that the bridge consists of a single photograph or a photograph with text. We would naturally expect the communication bridge to be very simple and the total process one that we could handle easily and quickly.

If we are producing a motion picture film, however, we often find we use all the possible audio-visual communication methods, for ordinarily film production

Figure 13.

requires art work, narration and sound recording, as well as motion picture photography. We would then develop a very thorough plan, give considerable attention to the supports, and attempt to achieve a well balanced unit. We are all aware of how one weak point in the process reduces the effectiveness of a film as a communication device.

Obviously it is possible to develop our analogy further just as one could elaborate on all the other points we have covered. For example, we could look at our bridge and identify the work methods

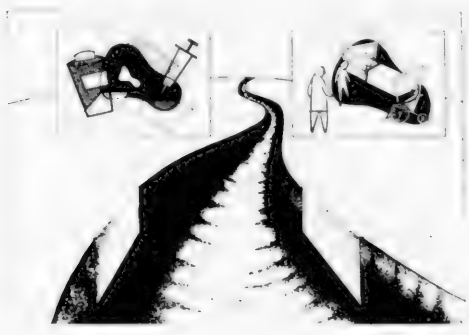

Figure 12.

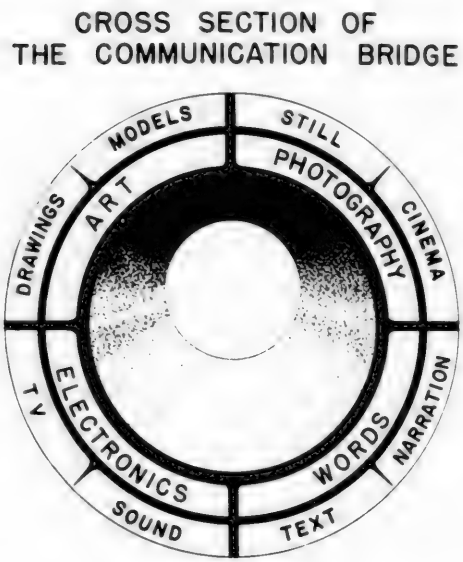

Figure 14.

of various kinds of medical illustrators.

However, regardless of the method of work, the illustrator is primarily engaged in fulfilling a communication need and he should be recognized as an expert in some phase of audio-visual communication for medicine.

Recognition, however, is not something that can be legislated. It requires more than a declaration on our part. It is a role that must be earned. It is my conviction that education programs and standards for medical illustrators should place considerable emphasis upon the "why" of our work as well as upon "what" we do and "where" we are employed. I do not contend that each person should have a working knowledge of the total audio-visual communication process. I do believe that his general knowledge of the process should be roughly equivalent to his knowledge of medicine for example.

You may say, and I would certainly agree, that any illustrator worth his salt has a genuine interest in the total process and regularly contributes advice for the preparation and use of medical illustrations. However, I believe that most of us feel that our primary skill and responsibility is in production. Movement in either direction from this point: toward planning on the one side or utilization on the other, often puts us into a no-man's-land. As a result, we feel much more secure if we limit declarations about our work to production techniques.

By establishing the identity of the illustrator and his relation to medicine we call attention to the purpose of our work rather than our method of working. It will help remind the medical staff that we are in the communication business. For example, we do not produce motion picture films. We do have film production techniques available for communication purposes.

I want to refer to the analogy of bridges to bring out another reason why I believe there should be a more comprehensive identification of medical illustrators and more emphasis upon the objective of our work.

The communication bridge identifies a number of different kinds of skills which are essential to the total communication process. In the bridge itself we can readily identify several functions of the illustrator in developing the communication form. We can also identify a number of other skills that are necessary for effective audio-visual communication. To me the analogy graphically points out the need for illustrators who have the same relationship to audio-visual communication that the engineer has to bridges.

In considering this comparison let us remember that the communication engineer must serve in a number of roles whereas comparable work done by the construction engineer is more specialized and often divided up among several

kinds of engineers. In the small medical illustration department one person may have to be all things to all people. In larger departments we should see the emergence of an increasing number of illustrators with the primary function of serving the needs of the total audio-visual communication process.

It is obvious that I am suggesting that we broaden our horizons. It is equally obvious that when one attempts movement in this way resistances may be encountered. The nature and amount of resistance will be determined to a great extent by our motivation. Our work environment will offer little or no resistance if we are motivated by a desire to provide better services to medicine. When this is recognized we will actually find the environment receptive.

I want to briefly refer to one other point which I believe emerges from this concept of medical illustration. Various specialties in medical illustration such as the photographers and the artist are alike in more ways than they differ. The fact that we all have a common objective suggests that it would be advantageous for us to regularly meet together for the purpose of discussing our common problems and of learning about techniques other than those we personally employ. Again, if we accept the logic, we must recognize that as our field continues to advance, a very close relationship is necessary and desirable for all of us. I wish we had time to pursue this point further for I believe it too is very important.

In conclusion I submit the following recommendations for your consideration:

(1) Individually we should constantly keep in mind the purpose of medical illustration. This does not in any way imply de-emphasizing techniques but rather recognition of the role of techniques as a means of reaching an objective.

(2) Collectively we should develop a program designed to extend our services to medicine. Training opportunities at both local and national level should be set up to help provide specialists in audio-visual communication. It should be recognized that this proposition is not incompatible with present plans for education and certification it only suggests an extension of these plans.

(3) With other specialists in medical illustration we should develop a program for the purpose of sharing experiences and cooperatively furthering our services to medicine.

This completes my presentation. I sincerely hope that my communication bridge has been successful. Its success is not dependent upon your being convinced of anything, but rather upon whether or not we have established a relationship which will lead to the exchange of ideas, and continued progress in our field.

Making Motion Pictures of Neuropsychiatric Patients

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Introduction

MOTION picture photography is a tool most useful for psychiatric research providing a means to collect data and to assemble material in an area of great importance for psychiatry yet one hardly accessible by carefully planned, intensive research without filming techniques. Evaluation of expressive behavior is often a decisive step in the clinical evaluation of patients. However, like the spoken word which eludes detailed analysis if not immediately recorded, expressive movements may escape our grasp the moment that we reach for them. Motion picture photography offers the remedy.

For the past seven years cinemaphotography has had a useful function in the neuropsychiatric hospital for Veterans at Lexington, Kentucky. At this hospital the motion picture is used almost exclusively for psychiatric research and education. Three separate purposes may be listed: First, to record the typical cases which are used as visual aids in the teaching program; second, to follow chronic developments over months and years, which serve as progress records for side-by-side inspection, which are in some ways comparable to time-lapse-photography. The experience gained through reviewing these progress records will lead to clues helpful in diagnosis and treatment of future cases. Third, though first in significance in the line of research, filming enables the research worker to discover unknown facts and to formulate the rules which determine the behavior of the mentally ill. In many respects analysis of the motion picture is superior to direct clinical observations. Like the microscope which makes visible what is invisible to the naked eye, the motion picture creates new possibilities for the psychiatric research worker. The rapid movement, which happens suddenly and then is gone, is preserved in all its details on the film. For example, a patient in the midst of action may suddenly fall into a rigid stance and then resume his activities immediately. This fleeting episode could easily escape the attention of the observer. The camera also sees more. Besides the statue-like position of a stupor described as uniform behavior, the camera records the minute unnoticed movements — a slight smile on the lips, the twitch of a muscle in the face, the quiver of the nostril, the darting of the eyes — mute variations which nevertheless may have great theoretical significance. Furthermore, a gesture may happen only once. Again the film can be projected again and again for repeated study. One patient may be compared with another or his own case may be studied from film taken at different times. On the film editor the

picture may be reversed, the speed increased or decreased, or stopped on individual frames. Thus the fleeting and elusive information is preserved.

Special Problems

Photography of the mentally-ill presents many special problems. When a patient is selected for photography, it is explained to him that we wish to have the photography as a matter of record and study, and that it will not affect his stay at the hospital. Releases for permission to use the films must be obtained from the patient, if he is competent; or from relatives or guardians, if the patient is incompetent. Some psychotics are quite unpredictable; they may strike out in a sudden attack or even surprise us with a suicide attempt. There is no script to be followed, there is no rehearsing, the action unfolds according to the sometimes unpredictable mood of the patient. Even if a rehearsal were feasible, it would not be desirable, for we are interested in the spontaneous movements, not in the patient's ability as an actor. In as much as photography creates an artificial atmosphere, modifying natural behavior, it interferes with its own task. A patient studied for his unusual display of mannerisms may not show them in the studio. If the lights and camera disrupt spontaneity it may become desirable to supplement the film taken in the laboratory with photography on the ward, in the swimming pool, dining room, corridors, or gym. Each one of these settings brings its own technical problems. The best approach is to minimize from the beginning the effects of photography on the patient. An even illumination is used in the studio with no lights being focused, or spotlighted directly on the patient. In order to elicit reactions and to obtain material for comparison a simple scenario is necessary, which is in the nature of performing a task. A sequence of simple tasks such as tying a tie, working a puzzle, pitching a ball, drawing a picture, gives the patient something to do. The objective is to hold his attention in order to reduce self-consciousness before the camera. The patient may be asked to memorize some numbers and to write them down on a blackboard at the far end of the laboratory. With his attention absorbed by the numbers, his walking to the board offers the opportunity to study his gait as it is in everyday life. The photographer, avoiding abrupt movements and reducing noise, should try to make himself as little noticed as possible. The photographer should be in a state of readiness at all times. It may happen that during the interval between tasks set by a scenario, the patient may show some of the most significant behavior. In the course of the filming, while the patient is allowed to move around the photographer should be ready to shift his action to any point of the laboratory. The selection of a new angle and lenses must become automatic. In short, extreme flexibility of photography is required.

Approaches to the Problems

We can never hope to find a perfect solution to all of the problems confronting the photographer. Some of the technical and psychological features operate one against the other. If we increase illumination in order to use a smaller lens to gain greater depth of field and reduce the amount of focusing required, then the brighter light may overwhelm the patient. If we move the camera behind a one-way mirror in order not to distract the patient, then we must increase the light with all the consequent ill effects; we thereby, also,

limit our perspective. Every solution must be a compromise. Approaches to the problems worked out by the Medical Illustration Service through experimentation over a period of time, may be of benefit to others faced with a similar situation.

Our present studio is 15 by 30 feet. This is small — it limits our angles and freedom in moving around. However, a room might also be too large. The brilliant illumination and the spaciousness of the room might have a disturbing effect on the patient.

For all practical purposes flat-type illumination is desirable. The overhead fixtures are equipped with mogul base sockets to accommodate #4 floodlamps. The lamps are used without reflectors. The ceiling is white and acts as a reflector, thus offering a diffused light throughout the studio. The #4 floodlamps, 3 in all, are spaced evenly in a single row. The ceiling is 12 feet high. To add to the scenes and improve the lighting, and to break the monotony in the scenes, #2 floodlamps in Vari-Beam reflectors are hidden behind two folding screens located on each side of the studio. The lamps are directed toward the walls and ceiling to give bounce-light effect. The same lights are used for silhouette series. A gray drape is placed as a background on one end of the studio. This drape with its vertical folds, acts as a means of a reference point when studying gaits of patients. Gait is one of the facets of study in the research laboratory. The illumination enables the use of the f5.6 lens opening and is effective in any part of the area. A test was made varying this lens opening and checked with the Eastman Laboratory to see within what tolerance we would be operating, using Super XX film. The Weston Meter was used to measure the lighting.

We have two cameras for our work. We use a Kodak Cine Special II, 16mm camera, equipped with Ektar lenses: fl.4-25mm; f2.5-15mm; f2.0-63mm; and f4.0-102mm. With the present level of illumination we are able to use the 102mm lens. Our Cine II has the 4-lens turret PAR adaptation, with the PAR follow-focus and the PAR Beamsplitter Finder. This enables us to see the actual scene being exposed on the film and reduces the chance of out of focus pictures. This combination of equipment enables the photographer to change lenses at will and to obtain better composition and sharper pictures at all times. We have additional film chambers for the Cine, which are loaded in advance and ready to shoot without losing footage between changing film chambers. Our second camera is the Bell & Howell, Model 70DA, 16mm. This second camera is indispensible because of its portability. It is used by the hand-held method and versatile in its use because of the turret head and the lenses, which includes a wide-angle, one-inch, and the 4-inch telephoto. It is used for all candid shots, to change the perspective by changing the angle of shooting, and in most cases where it would be impractical to dismount the larger camera. The Bell & Howell is used for the gait series. Scenes taken with a Bell & Howell are spliced into films taken with the Cine II to add to the comprehensive report and give the film smoother action. To accomplish the gait series, we use the silhouette lighting setup. The overhead lights of the studio are switched off and the side-lamps, located behind the portable screen, remain on. The wide-angle, 15mm lens is used at f2.5. The outline of the patient is clearly outlined against the vertical folds of the gray background drop mentioned earlier, as he steps toward and away from

the camera and then across the width of the studio. Our camera is mounted on a professional tripod and dolly for steadier pictures and easy portability.

Experiments With Eastman Tri-X Films

Introduction of higher speed emulsions are contributing a great deal to this special type of motion picture photography. We have been experimenting with the new Eastman Tri-X Negative and Tri-X Reversal films. Using the 150-watt incandescent lamps as illumination, which are used throughout the working areas of the hospital, we used a f2.5 lens opening with camera speed of 16 f.p.s. Where daylight was mixed with the tungsten lights, f5.0 lens was used. With direct daylight, or where the ratio of the daylight to tungsten is greater, Tri-X is not recommended. Sensitivity of Tri-X emulsion is too great, when daylight is the sole source of lighting in a ward or near a grouping of windows. Comparing both films and using identical lighting set-ups, Tri-X negative offered a stop to stop and a half more exposure than the Tri-X reversal. Here again, personal choice and necessity determine which of the films to use. The films were also tested under fluorescent lighting. It is cooler to work under these lights. Tri-X negative has softer emulsion and requires careful handling, but the processing for this type of film is offered by fewer laboratories. Tri-X reversal, somewhat faster than Super-XX, can be processed by many laboratories offering service to the motion picture producers. We are fortunate to be able to have our film processed by our local TV station. While the data and work is still fresh in our minds, we can have our film returned to us in a matter of a few hours and view the results the same day. Experiments are being continued in exposures and with processing laboratories. Our experience indicates that the processing laboratories vary a great deal in the quality of motion picture film processing. For an example: Labs vary in their processing Tri-X reversal; some make better work prints, while others make better release prints from Tri-X negative film.

In addition to our photographic session with the patient, we have the patient interviewed and the conversation recorded through the use of concealed microphones. The microphones are situated behind the folding screens balanced to give a fair reproduction. The recorder adds to the information being collected on the patient. In most cases the patient is interviewed with the microphone in plain sight.

Devices Used In Photography

Devices should be so designed that they will appear ordinary to the patient. Something that is a day-to-day familiar sight will allow the patient to feel at ease. Concealment can be easily achieved with the cooperation of the staff and ward personnel. Cameras should be placed in strategic positions to get the maximum area necessary to film the patient.

Summary

Making motion picture films of neuro psychiatric patients differs from the Hollywood type of production. Mentally ill patients cannot be asked to repeat significant movements; hence, departures from the optimum conditions of lighting and camera are required. The main objective of this type of photography is to record and collect information. There can be no back-ground music to set pace for a mood, nor can dramatic lighting be placed on the pa-

The camera used is a Cine Special II with PAR Adaptation. The PAR Adaptation permits use of 4-lenses which are mounted in the turret and also includes a follow focus device. You see what you are shooting all the time. The tripod and dolly must be sturdy and easy to move about. The seat is comfortable for the long shooting sessions. The turret head with 4-lenses permits the changing of ranges with a mild series of zoom shots by dollying in slowly when the need arises.

tient. The camera records on the film the action of the neuropsychiatric patient which is unpredictable and spontaneous. A great deal of the success of the photography depends on the willingness and cooperativeness of the patient. A team-like relationship between Psychologist and Photographer must also exist in order to produce successful results. Working with the Psychologist

The room appears normal, although a little brighter due to the overhead ±4 floodlamps. The grey drapes show vertical lines by which the gait studies are made. The slide lights, partly concealed in this view by the portable screens on the sides of the room, are left "one" for the silhouette series. The room is small enough to be comfortable for the patient and examiner, but somewhat of a handicap for moving the camera to other areas. Its size is 15 x 30 feet.

and reading the patient's medical history will prepare the photographer to some degree on what to expect. The areas of lighting and exposures are a constant problem.

There are no hidden formulas or secrets about this form of specialized photography. The timing, the originality of composition and the tempo of the shooting of the film is the responsibility of the photographer. Techniques for obtaining a comprehensive report of the patient's activities are developed through the efforts and teamwork of the psychologist and photographer on their day-to-day film coverage.

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Idem: Pseudoreversibility of Catonic Stupor, Amer. Jour. of Psychiatry, 111, 680-685, 1955

Speedlights in the Color Photomacrography of Living Insects[1]

D. C. ANDERSON[2]
[2]Forest Insect Laboratory, Sault Ste. Marie, Ontario, Canada.

NO doubt many photographers of insects have had the exasperating experience of having the subject in just the right position to photograph only to have it move out of the field of vision when the exposure is being made; this difficulty can now be largely overcome by the use of speedlights.

In using older methods of illumination, one had to contend with time exposures and the heat generated by the lamp; the latter in most cases made the insect unwilling to stay in any one position long enough to be photographed. There are a number of ways to subdue the insect but they all have disadvantages. Ether or chloroform causes regurgitation and a resulting loss of color, especially in the larval stages. Under narcosis by either of these reagents or carbon dioxide, the insect loses its ability to support itself and thus its natural appearance is lost. Furthermore, the high excitation that results from the use of carbon dioxide, makes it difficult to use, both in the initial stages of anesthesia and during the precipitous recovery of the insect, and often leads to damage to the insect, for example, loss of wing scales of moths and butterflies.

The advantages of the speedlight over the usual sources of artificial illumination are chiefly:

(a) Deep anesthesia of insects is unnecessary, and this is especially important where the insect is to be reared so that a complete life-history can be photographed. The more active insects are best kept in a cold room or refrigerator (40° F.) until ready to photograph, and while they are recovering from this enforced inactivity, there is usually ample time to make a series of exposures. Moreover, since no feeding occurs during the period of inactivity but usually resumes while the insects are warming up, natural looking pictures can frequently be obtained.

(b) Long exposures are unnecessary, any motion of the insect being frozen by the speed of the light.

(c) The effects of vibration in the photographic set-up are eliminated.

(d) The light source is cool.

(e) The speedlight gives *constant* daylight color.

The equipment used in the Forest Insect Laboratory, Sault Ste. Marie, Ontario, (Fig. 1) consists of an "Ascor" speedlight, 350 watt-second unit with three lights,* a stand fitted with a carrying arm, a fine focusing slide, and a bellows device with reflex housing. A microscope lamp is sometimes used to provide additional light while focusing

[1]Contribution No. 406, Forest Biology Division, Science Service, Department of Agriculture, Ottawa, Canada.
*Manufactured by American Speedlight Corporation, 480 Lexington Avenue, New York 17, N.Y.

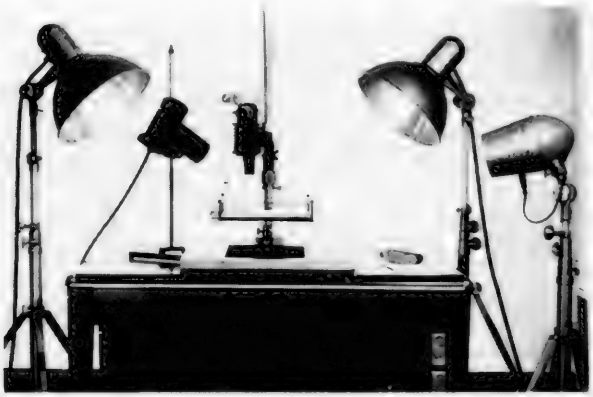

Figure 1. Speedlight and photographic equipment used in the Forest Insect Laboratory, Sault Ste. Marie, Ontario.

Figure 2. Second-instar larva of the Pine horned devil, *Citheronia sepulchralis* Fab. 7x

Figure 3. First-instar larva of *Pheosia rimosa* Pack. 9x

Figure 4. The gregarious Swaine's sawfly, *Neodiprion swainei* Midd., in their final feeding stage. 4x

Figure 5. A first-instar notodontid larva. 6x

on the subject. Two Leica cameras may be used interchangeably, one loaded with day-light color film and the other with black and white film. The stage on which the insect is placed is adjustable to permit photographing from various angles.

The advantages inherent in the use of speedlights reduce the number of variables to one. The lamp-to-subject distance remains constant up to a magnification of 5, due in part to the light output of the unit and reciprocity failure of the photographic emulsion. The

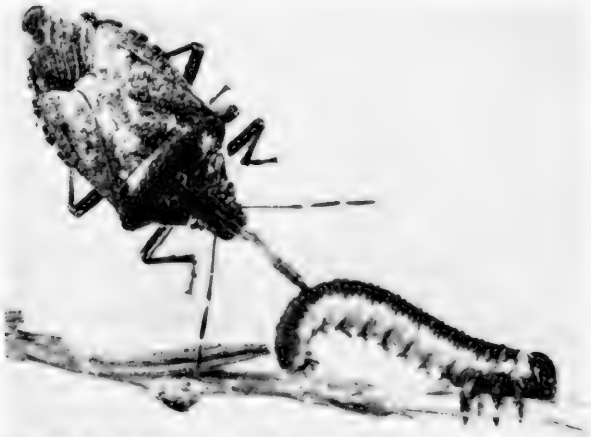

Figure 6. Pentatomid bug feeding on larva of the Larch sawfly, *Pristiphora erichsonii* (Htg.) 4x

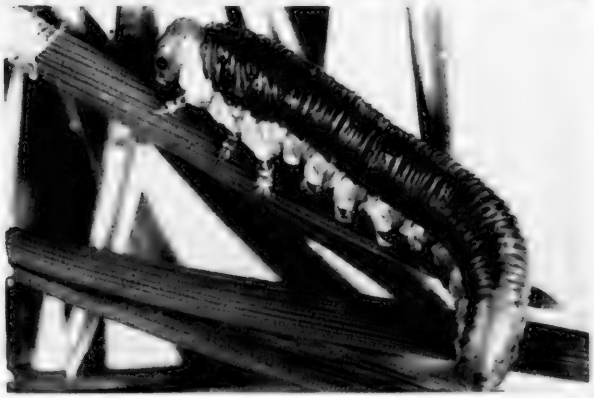

Figure 7. Sawfly larva, *Neodiprion* sp., in the final feeding stage. 8x

length of exposure is unimportant, although focal plane shutters are usually set at either 1/25th, 1/30th, or 1/50th of a second. *This leaves only the lens diaphragm to control the amount of light reaching the film.* Exposure tables must, of course, be worked out for each individual lighting set-up.

As a general rule a blue background is used because in photographing insects color contrast is important. By using a background color complementary to that of the host plant, and the insect, a good balance can usually be achieved.

The accompanying Figs. 2 to 7 have been chosen to illustrate the fairly consistent results obtainable using a series of lenses at various magnifications. Figures 2 to 7 were copied and enlarged from 35 mm. Kodachrome transparencies.

A Versatile Variable Voltage Power Control Unit for Photographic Work

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THE power control unit described here was designed primarily to give flexibility of lighting control but has served also in other uses. It was designed to permit each of six pairs of outlets to be connected to a variable voltage or to line voltage, or turned off. An A.C. voltmeter connected in parallel with one of the pairs of outlets can be used to measure the variable voltage of line voltage. An A.C. ammeter in series with the input line can be used to measure the input current.

The original purpose of this power control unit was to permit raising of photofloods to line voltage without high starting current surges, then making the autotransformer voltage available for other light balancing. The voltage may be raised as high as 135 volts, enabling ordinary lamps to be burned at high voltage, raising their brightness and color temperature; or lower voltages may be supplied to lamps for control of relative brightness of main and fill in light for black and white work. This control unit permits correction of slow fluctuation of line voltage for applications requiring precise control of voltage. The voltages in the range of 115 volts can be read to 1/10 volt and brought back to within 1/5 volt of the desired voltage by use of the autotransformer. One application of this apparatus has been regulation of the voltage supplied to a 1000 watt 16mm projector for adjustment of image brightness to give the most satisfactory apparent contrast in a stereo perception experiment. It has also been used with this same projector to project 16mm film images for printing on 3¼" x 4" lantern slides. With a 1000 watt lamp operating at 10 volts, a 2 second exposure time was possible. The 25 ampere capacity of the ammeter and the 20 ampere capacity of the 2 KVA autotransformer give the system the capacity to handle such loads quite easily. The circuits have been designed to use a 30 ampere supply circuit. Number 10 wire is recommended for 30 ampere circuits. This power control unit is not sparkproof and not adapted to use in explosive atmospheres.

The electrical apparatus is attached to a sturdy table mounted on rubber wheeled casters (Fig. 1). This table measures 24 inches wide, 18 inches deep, and 28½ inches high. Six pairs of outlets are provided, three pairs per side of the table. Each pair of outlets is located near a pair of switches which select between line voltage and autotransformer voltage, or turn the outlets off and on. The voltmeter is connected in parallel with the left switch of the pair of switches at the front right corner of the table. The right switch

Figure 1. Variable voltage power control unit for photographic work.

of this pair is the master switch, controlling the input line. The ammeter is connected in series with the input line. The ammeter available had a 5 ampere range which was extended to 25 amperes with a 4 terminal shunt made in our shop. The pairs of switches controlling the six pairs of outlets are arranged with the Off-On switch nearest the outlets and the Line-Variac switch nearest the autotransformer mounted in the center of the table. The labeling of the switches was done by engraving the bakelite switch plates and filling the cuts with white paint.

The autotransformer used is a model *V-20M Variac*. The various connections possible include one giving a maximum voltage of 135 volts. This was selected because of the desire to supply higher voltages to burn ordinary lamps at higher intensity. This choice necessitated the construction of a specially designed stop to prevent the inadvertent increase of voltage above line voltage. The stop is shown in Figure 2. It consists of a 1/32 inch thick brass strip firmly attached to the dial of the variac by the screws under it, and a milled duraluminum stop attached to the case of the variac. The brass strip must be pushed down to permit the variac to be turned to voltages higher than line voltage. The stop is cut away on the high voltage side to permit the brass strip to be pushed down automatically when voltages are being decreased.

The circuit shown in Figure 3 is designed to be used on current from an ordinary two contact outlet without the grounded side being specified. The resistor R_1 and the neon bulb are used to test polarity which indicates a difference in potential between the high voltage side of the circuit and ground potential of a solidly grounded conductor such as a water pipe. An intermittent press to read switch protects the operator by connecting the probe to the high voltage only at times when the switch is pressed. The other wire of the input

Figure 2. Stop used to limit voltage of Autotransformer to line voltage. Pressing down on the brass strip will release the autotransformer to give higher voltages.

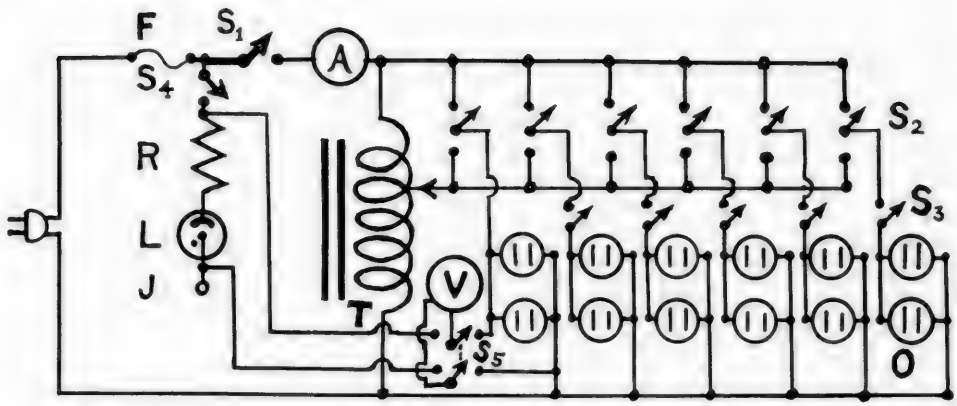

Figure 3. Electrical wiring diagram.

T: Variac T-20 Autotransformer.
S_1: Single contact 120 volt 30 ampere switch.
S_2 and S_3: Single pole double throw switches.
S_4: Momentary contact push-button switch (electronic component type, *not* doorbell).
S_5: Double pole double throw switch.
O: Double outlets at side of unit.
A: A.C. voltmeter: 0-25 amperes.
V: A.C. voltmeter: 0-150 volts.
F: Fuse: 30 amperes.
R and L: A neon indicator lamp with built-in resistor.
J: Jack for probe lead.
B and S 10 copper wire is required for 30 ampere circuits.

pair would be indicated as the ground and is connected to the ground side of the control unit when a potential difference exists between the hot side of the input system and a grounded object. The testing of correct polarity is indicated by the lighting of the lamp when a test lead connected at the jack is touched to a grounded conductor, and the switch S_4 is closed. S_5 connects the voltmeter across this tested potential. The feature of polarity testing is of importance if this device is to be used around darkroom sinks in conjunction with apparatus which might develop a short to their metal parts. When the polarity is correct, the output plugs are connected to the ground return wire when turned off, rather than to high potential. By reversing the input plug to the control unit, each side of the input could be subjected to a test of potential between it and a grounded object. In a darkroom arrangement all exposed metal electrical devices should be grounded with heavy wire.

In order to have an unbroken circuit on the ground side of the circuit, the ammeter is connected in the primary circuit on the high voltage side, as are the fuse, indicator lamp, and switch. The binding posts of the ammeter are uninsulated metal. Insulating caps made of plastic to keep them from being touched. The binding posts of the voltmeter are bakelite insulated terminals and they are insulated further by use of electrical tape at the ends of the wires connected to them. The ammeter is a *G. E. Type AP-9* and the voltmeter is a *G. E. Type AP-9*. The voltmeter leads in ordinary operation are plugged into an outlet in the side of the variac. This cord may be unplugged and then plugged in to one of the pairs of outlets at the front right hand corner at the table which are in parallel with the test lamp across the potential between

the tested hot lead and ground.

The end of the cable to the power control unit is clamped inside the back panel of the table, to prevent tension on the cable from pulling it loose. For storage, the cable is wound around a pair of brass hooks located at the back of the table. A 30 ampere fuse is accessible from the bottom of the unit. The press-to-read switch, the neon indicator lamp and the jack for polarity testing are located at the bottom edge of the right hand panel.

If it is desired, grounding could be accomplished by the use of three wire cables, and polarized plugs and outlets with grounding terminals. However, this method would restrict the use of the power control unit to polarized wall outlets.

Report on the New Ansco Printon. B. Schwalberg. *Pop. Phot.*, **40:** 71-1, 144-47, 150. January, 1957. Printon, Anscochrome Type, is a recently improved reversal printing material for making color enlargements. The author reports that its shelf life permits a 12-month dating period and, under average storage conditions (50° to 70° F. and 40 to 60 percent relative humidity), almost no change occurs between the fourth and fourteenth month. It is reported that the speed is about equal to 50 percent of the printing speed of a normal grade of enlarging paper; that the nature of the acetate base is partly responsible for the brilliance and clarity of the print; that the reciprocity failure is small over the normal range of exposure; that the stain level is very low, making possible more brilliant colors and cleaner whites; and that the technical requirements for enlarging are not rigid. The Ansco color-compensating filters are described, and a color wheel is shown and explained. A chart gives the times and temperatures recommended for the thirteen processing steps. M.B.K.

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Simple Method for Making Radiographic Facsimiles

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THERE have been many occasions when facsimiles of valuable radiographs have been desired for various reasons. For example: safe keeping of the originals while the duplicates are used for teaching, demonstration or other purposes; and for transmission to outside consultants or institutions. While this problem is not original it has been difficult to find references sufficiently detailed to enable the photographer to duplicate films at will. The usual method has been to make a copy negative and then a positive print on film. This is time consuming and not necessary in most instances.

The method herein described requires no dark room and no equipment which is not readily available to the medical photographer or x-ray technician. A normally lighted room is suitable as a locale. The material used as raw stock can be any of the commonly available films used in producing original radiographs by exposure to x-rays. The exposure times may vary from print to print or slightly from emulsion to emulsion but these may be determined rapidly by trial and error. The author has used Eastman Blue Brand film and Du Pont high speed x-ray film with equal success. The chemicals used may be any standard x-ray or print developers, stop and fixing baths. The washing procedure is the same as with original films.

An x-ray illuminator of the fluorescent type for uniform light distribution or a #2 photo flood bulb may be used. When using a photo flood bulb a comparable exposure to that of the x-ray view box will be obtained at a distance of about 3 feet using a 10" reflector. The film to be copied is placed in a contact frame in contact with the raw stock. If a frame is not available a sheet of glass may be used for good contact with the film against the table or a sheet of plywood. This sandwich is then placed in contact with the x-ray illuminator and the exposure made. The average exposure has been 25 seconds on Eastman Blue Brand film, or a minute and 30 seconds on Du Pont high speed with original films of average densities. This may vary somewhat with local conditions. The box of film may be opened in room light if it is to be used for no other purpose. The film is then developed either in a tray or tank at standard times and then fixed and washed as usual. When developing the film in a normally lighted room, it has been found advisable to cover the developer tray with a piece of opaque cardboard in order to avoid slight traces of fog in the clear areas.

It will be found that when the facsimile has been made as outlined above there may be excessive contrast in the copy. This is desirable when using flat originals. However the contrast may be diminished by pre-exposure of the raw stock prior to making the copy. It has been found that the average film will require a pre-exposure of 2 to 3 per cent of the total exposure time. This pre-exposure should be made without interposing anything between the film stock and the light source. This procedure results in a lessening of the maximum density which can be obtained on the film. This naturally results in a lower density range. X-ray films should be handled carefully in order to avoid pressure marks at points of contact or bending.

A neutral density step tablet may be used in order to help determine the exposures which may be necessary under particular conditions encountered at any location. This is useful but not essential. An electric timer is a convenience in turning the lights on and off, but is not a necessity.

It should be borne in mind that the more exposure that is given the less density will result in the finished copy. Adjustments may be made in exposure times keeping this principle in mind. After a few trials a smooth procedure will be evolved in which a number of facsimiles may be made in a short time. It will be found that the exposure times do not vary greatly from film to film, in spite of their differences in density and contrast.

The above method has been in use successfully and has been taught to others in a short time and can be used almost any place where there is room to place the various articles. It requires no special conditions or materials.

Now You Can Determine the Gamma. *Photo Magazin* p. 62, February, 1957. A simple method is described for determining the gamma of the negative without the use of a sensitometer or a densitometer. Two negatives are exposed in a camera, one with normal exposure and the other with twice the exposure. Almost any scene can be used, provided the lighting remains constant for the two exposures. When the negatives have been processed, they are printed on a paper having a fixed contrast. The printing exposure is adjusted by trial until identical prints are obtained from the two negatives. The ratio of the printing times required for equal prints is recorded. The logarithm of this ratio is proportional to gamma. A table is given showing the relation between the ratio and the gamma; for example, if the ratio is 2.0, the gamma is 1.0. If the ratio is 1.74, the gamma is 0.8. C.N.N.

New Products

NEW 36-PAGE EXAKTA CATALOG NOW AVAILABLE

Exakta Camera Company announces their new 1957 Catalog, titled, "Exakta Unlimited" is now being mailed to registered owners of Exakta and Exa cameras.

This new Exakta Catalog has 36-pages and contains 92 pictures, illustrations and diagrams. It vividly illustrates and describes the latest equipment which is available from Exakta—and shows how this equipment continues to make the Exakta the "World's Most Versatile Camera". Each product, including the New 1957 Automatic Exakta IIa, New Automatic Exa Automatic Lenses, and accessories are not only described in detail, but there is an explanation that tells the rule with such information as speed, nearest focusing distance, number of diaphragm stops, smallest stop made of view weight, overall length, and filter size. There are also 29 diagrammatic formulas of lenses which show the element construction of each lens. Technical information is presented informally in a free discussional style so that the Exakta owner may have the opportunity of learning what he may expect from each lens and what Exakta equipment. A separate section is devoted to price lists of Exakta and Exa Cameras, Lenses, and Accessories and Publications.

The Exakta Catalog, entitled Unlimited, will prove to be a valuable reference source of information for Exakta Dealers and Exakta owners. The new catalog is printed in two colors on Kromekote paper in a 5 x 8 inch size. Owners of Exakta and Exa cameras who have not received their Catalog may write to Exakta Camera Company for a FREE Copy.

NEW CARL ZEISS JENA 80MM. F/2.8 TESSAR LENS NOW AVAILABLE FOR EXAKTA

Exakta Camera Company is proud to introduce the New 80-mm., f/2.8 Carl Zeiss Jena Tessar lens with preset diaphragm for 35-mm Exakta cameras. This lens, which is outstanding for sharpness, brilliance and contrast, will earn the admiration of creative photographers everywhere, especially in the field of portrait photography. In natural light portraiture, the photographer can easily capture all the character of a face without any distortion due to perspective. Sensitive expressions, individual mannerisms, all-important highlight, glamorous portraits of women—all are recorded on film reassuringly with the 80-mm Carl Zeiss Jena Tessar lens.

The 80-mm Tessar can be focused from infinity down to 3.3 feet. A depth of field scale is provided to show the area that will be in sharp focus. There are 7 diaphragm stops: f/2.8, 3.5, 4, 5.6, 8, 11 and 16. The angle of view of the 80-mm Tessar is 30.5°, the overall length of the lens is 3 1/8 inches. The lens weighs 13 ounces. It takes a series 7 filter. Finished in chrome mount, the Carl Zeiss Jena F/2.8 80-mm Tessar lens with preset diaphragm is priced at $145.50 list. It is available at all camera stores. For more information, write to Exakta Camera Company

NEW ALPA LENS GIVES MORE THAN 7x MAGNIFICATION

An ideal telephoto lens for wildlife, sports events and any distant views is the lightweight (3 lbs.), compact (10") and extremely powerful ALPA Tele-Xenar 360mm, F/5.5.

The radically new lens construction offers excellent contrast and sharpness. All-surface coating and internal baffles prevent the loss of light due to reflection, while the rare earth elements render maximum light transmission and reduce the secondary spectrum to a minimum.

The rotating mount allows the lens to be turned 90° for both vertical and horizontal pictures with calibrations remaining in the same position and without removing it from the tripod. The preset diaphragm allows viewing at full aperture with exposures at any preselected stop down to f/32. Acceptance angle is 7° and the focusing ranges from infinity to 15 feet with an easy-to-read depth of field scale.

Although the use of a tripod or gunstock is generally recommended, the ALPA Tele Xenar may be used for handheld operation at shutter speeds of 1/250th of a sec. or faster.

Each ALPA Tele-Xenar is twice individually tested, by the lens manufacturer (Schneider, Germany) and at the ALPA factory, carries an unconditional guarantee for highest optical performance.

Distributed in the U.S. exclusively by Karl HEITZ, Inc., 480 Lexington Ave., New York 17, N.Y. the ALPA Tele-Xenar retails for $229.00 and is available through all franchised ALPA dealers.

COMPLETE SET OF APOCHROMATIC LENSES FOR 16mm MOVIE CAMERAS

The KINOPTIK APOCHROMATS, the first and only lenses for 16mm motion picture photography, which provide exclusive correction of ALL primary colors, come in a complete and perfectly matched series ranging from 15mm to 500mm focal power.

The unique APOCHROMAT formula uses fluorite optical Lanthanum glass with exceptionally high refractive power and extreme dispersion. Equidistant, easily legible lens stops, depth of field scales and adjustable, tight-locking

mounts provide utmost ease of operation. The rigid construction prevents all undesirable play and lends efficient protection against corrosion and extreme temperatures.

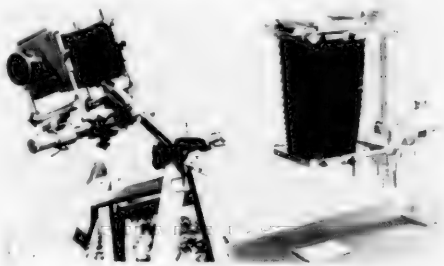
The result of many years of experience and research in APOCHROMATIC design, these handpicked lenses also offer exceptional overall brilliance, highest contrast and extremely critical sharpness up to the very corners, even at full aperture. Each lens is individually tested on an optical bench and carries an unconditional guarantee for highest optical performance.

Proxar	incl.	lens	15mm	f/5.6	
[illegible]	[illegible]	mm	f/4.5	[illegible]	25mm f/4
[illegible]	[illegible]	32mm	f/4.5	$179.00	50mm f/4
[illegible]	[illegible]	75mm	f/4	[illegible]	[illegible] mm f/4
[illegible]	[illegible]	125mm	f/4.5	[illegible]	[illegible] mm f/2.5
$399.00	300mm	f/3.5	$449.00	500mm	f/5.6
$499.00					

Distributed in the U.S. by Karl HEITZ, Inc., 480 Lexington Ave., New York 17, N.Y., the KINOPTIK APOCHROMATS are now available through franchised dealers.

ALL-PURPOSE SINAR CLAMP REPLACES TRIPOD

This extremely flexible and easily portable accessory attaches the Sinar — Swiss interchangeable View Camera: 4 x 5, 5 x 7, 8 x 10 — to tables, fence posts, ladders or most any other available support. Supplemented by a



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PM COMPACT V-PAK BAR LIGHT

A revolutionary new bar-light has just been introduced that completely outdates all other brands ever put on the market. This exciting piece of portable lighting equipment for home movies is known as the PM COMPACT V-PAK. This extremely compact unit features a unique V shape case design that allows the bar light to be slipped into the metal carrying case without removing the hot bulbs, the camera or the bar-light handle.

The radically new Compact V-Pak has many desirable features that are not available in any other type of bar light. The unique "V" shape allows it to accommodate reflector flood lamps while they are still hot. This, of course, eliminates the common and awkward problem of what to do with your bar light between shots. You merely slip the bar light, bulbs, and camera, into the V-shaped case, and the bar light and bulbs are suspended firmly. This convenient feature will put an end to the traditional disaster of hot bulb breakage upon contact with the cold metal case; or scorched rugs and floors; it also lessens the danger of personal burns.

The extremely small size of the V-Pak (only 3¼" long 6" high) is the result of extensive research and clever design. And the compact size is possible only because of the amazing new PH375/34R3 flood lamp. The Compact V-Pak uses four PH375/34R3 reflec-

tor flood lamps, each of which is one-half the size of the standard 375-W bulb, yet gives an equal amount of light. Truly the pace-setter in the portable lighting field, the new, modern V-Pak gives one of the most concentrated sources of direct, uniform flood-lighting available.

Ideal for shooting action movies indoors or outdoors, in black and white or color, the Compact V-Pak is a wonderfully light weight, mobile unit to carry about and to use. The new modern V-Pak is unquestionably one of the most convenient units ever offered! Any camera can be attached to the bar light quickly and easily and it will always point in the same direction as the flood lamps. The bar light is equipped with a detachable side-grip handle. The attractive all-metal case will last as long as the bar light itself; it has a streamlined carrying handle for easy portability. To make it easier to use, there is a helpful chart of suggested aperture settings on the bar light.

Retailing for the very reasonable price of $12.95, plus bulbs, the PM Compact V-Pak is now available at photo stores and departments all over the country. Feature for feature, the new, small V-Pak has already made other brands on the market outdated. Before you buy any brand, see the Compact V-Pak and compare it with all others; it is the finest value on the market, regardless of price. For literature, write Arel Inc., 4916 Shaw Ave., St. Louis 10, Mo.

NEW ENDOSCOPIC MEDICAL ATTACHMENT NOW AVAILABLE FOR EXAKTA CAMERA

Day after day, and year after year, photography continues to play a larger and more important role in medicine.

Realizing the sure but somewhat limited nature of its application until now, special custom-made camera equipment was formerly only available to hospital and well-affording physicians and government agencies. Most of such equipment was manufactured on special order in Germany and in Austria. Some of it was made in the United States. Essentially scientific in instrument and equipment, sometimes required the employment of a special photographic technician in addition to its high initial cost.

As a result of the close association between Ihagee and the City Hospital Dresden-Friedrichstadt Clinic in Dresden, Germany, a Colpophot, for Exakta was perfected which made it possible for the early diagnosis of cancer of the uterus through Colpophotography with the Exakta camera. This was a pioneering move towards the manufacture of popular-priced camera equipment for medical photography.

Continuous research by Ihagee in the field of medicine led to the discovery of the Exakta

Endoscope Adapter — a marvelous, inexpensive instrument unit which attaches to an Exakta camera and an Endoscope making it possible for a physician to photograph the

cavities and inner organs of the human body which are not easily penetrable from the outside. This too was a revolutionary step, for now scientific information was available to the physician on film for positive record keeping and identification through the use of an inexpensive adapter with the Exakta camera.

The precision Endoscope Adapter is so constructed that it can be used with such medical instruments as the Cystoscopes, Thoracoscope and Gastroscopes as well as with the Endoscope.

The Endoscope Adapter for the Exakta camera at $39.50 is available through camera dealers everywhere. For more information on the Endoscope Adapter, please write to Exakta Camera Company.

FALSE SAVINGS

With the travel season rapidly approaching many American tourists will be going abroad. Many of these people will visit Germany, the country noted for its fine precision cameras, lenses, microscopes and optical instruments. And while many of these American travelers intend to buy a fine German camera a number of them will select the new Automatic Exakta II camera.

It is quite natural for the American tourist to assume that the prices for Exakta cameras in Germany are cheaper after all there is only to pay duty and no excise taxes etc. in the country of origin.

This however is deceptive!

The European model of the Exakta camera is called "Varex". Lenses for "Varex" models of Exakta cameras are known by other names too. These European lens names are trademarked and registered in the United States and their import into the U.S.A. is prohibited. Even if the camera with such lenses passes customs, it nevertheless is unobtainable for the camera when certain patent infringements may be encountered.

Exakta cameras purchased in Europe do not carry the American Service Guarantee and without this guarantee, the resale or trade-in value of the European model Exakta camera is reduced. This usually leads to confusion in price between the European price and the American price. Thus, a European model Exakta camera is actually worth more than an Exakta purchased in the United States.

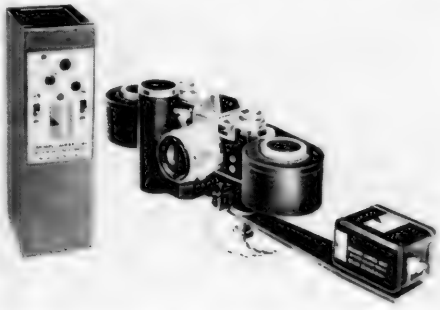
Exakta Camera Company would like to call these facts to the attention of tourists going abroad, so that he should not be misled by "False Savings".

PRAKTINA FX RADIO CONTROL UNIT

A Radio Control Unit which permits operation of the Praktina FX camera automatically at distances up to a mile and more from the camera itself, without external wiring, is announced by Standard Camera Corporation. The new development is the brainchild of Erwin Seiler, Manager of the Technical Department at Standard Camera Corporation.

The unit provides for the first time in any commercially available 35mm camera a method of remote control operation which will prove invaluable to nature scientific investigators, animal photographers.

The simple method of operation was developed by Mr. Seiler as part of a research



investment designed to provide photographers with the utmost in versatility and ease in their photographic equipment while the

era and operator are forced to be at a considerable distance from each other.

The Praktina FX Radio Control Unit works in conjunction with the Praktina FX camera and the Praktina FX Electric Motor. Up to 420 exposures are possible, using the accessory Praktina FX 50-Foot Capacity Bulk Film Magazine, or either 20 or 36 consecutive exposures with standard film rolls.

In operation, the Receiver component of the Praktina FX Radio Control Unit is plugged into the Electric Motor attached to the Praktina FX camera. The Transmitter component may then be used at any distance up to a mile or more from the camera to close a relay circuit which activates the Electric Motor to operate the camera. A sequence of operations takes place in which the shutter is released to take the picture, the film is transported to the next frame, and the shutter wound for the next exposure.

Every time the photographer presses the button of the Transmitter, he will take a picture. He can take individual photographs at selected intervals, or sequence photographs by merely pressing and releasing the Transmitter button repeatedly. This can also be performed mechanically by cycling timers.

The Praktina FX Radio Control Unit may be set up to operate as many cameras as the photographer wishes from the same Transmitter. Or, the photographer will have available to him matched Transmitters and Receivers, permitting the operation of batteries of cameras, each from its own Transmitter.

Manifold uses are seen in all phases of photography. The nature photographer will be able to set up his equipment for battery operation near an animal watering hole or overlooking a bird-nest, for example. From a vantage point up to a mile away, he will be able to follow animal action through a pair of binoculars while activating his Praktina FX camera with the Radio Control Unit. The animals will not be frightened off by human scent or in any way distracted from their normal behaviour patterns. The resulting photographs will be excellent examples of animal life which can be used for illustration in magazines and books. Naturalists are expected to be heavy users of this equipment.

The Radio Control Unit will also appeal to factory managers and chief engineers concerned with quality control. Praktina FX cameras can be set up singly or in batteries at strategic points, to be triggered in random or periodic patterns for statistically quality control procedures. In areas where human operation of the camera is excluded because of dangerous conditions, such as excessive temperature, deadly fumes or radiation, the Praktina FX camera could be set up and triggered remotely to provide a complete visual record of a procedure for subsequent analysis.

The new unit will have many uses in the field of intelligence and surveillance. The Praktina PX camera and accessories could be hidden compactly in a small case, with an opening for the lens only. It could then be triggered by the Radio Control Unit, with the party under surveillance completely unaware of the fact that he was being photographed.

Many uses are seen in department and other stores where shoplifting accounts for millions of dollars in losses annually. In jewelry stores, for example, the Radio Control Unit could be set into operation when a contact is broken in a locked case to take a sequence of photographs of the person tampering with the case. Banks could install the unit over vaults and tellers' cages so as to provide a visual record of criminals' faces and actions for crime-detection officers.

Military photographers could set up equipment at strategic positions on the field of battle and trigger their cameras from safe distances.

Professional photographers will find the Radio Control Unit extremely useful in covering such mundane affairs as weddings, confirmations, graduations, etc. The camera could be set on a tripod next to the aisle, and another set up 10 or 15 feet away. Radio Control Units, operating on separate bands could be used to provide both color and black-and-white photographs of the marriage couple and the guests while the photographer sits comfortably in a nearby chair and triggers each camera as the guests pass a previously marked target point.

News and sports photographers will be able to cover significant events from many different points in sports arenas and convention halls by sitting at a central control point and operating as many as a dozen different cameras at the same time from a single control panel. In basketball games, for example, cameras

could be set up to cover each basket and the center of the court for jump shots.

Many more applications, in the fields of professional, industrial and scientific photography, will evolve in the future as the equipment is field-tested and evaluated. Present indications, according to Mr. Sadler, point to the Praktina FX Radio Control Unit as one of the most fruitful photographic developments in recent years.

The price of the Praktina FX Radio Control Unit, including Transmitter and Receiver (less batteries) will be about $100.00. List price of the Praktina FX camera with 58mm C. Z. Biotar f/2.0 lens is $297.50. (Various accessory lenses from 35mm to 400mm focal length are also available.) List price of the Praktina FX Electric Motor is $150.00. List price of the 50-foot Bulk-Film Magazine is $69.50. For complete information, write to Standard Camera Corporation, 319 Fifth Avenue, New York 16, N.Y.

Report on the World's Fastest Film. B. Schwalberg. *Pop. Phot.*, **40:** 94-5, 125, June, 1957. Kodak Royal-X Pan Film, having an A.S.A. exposure index of 650 and a practical exposure index of 1600 with normal development, is reported to produce usable negatives from exposures equivalent to an exposure index of 8000. Although it had been used under a code name by press photographers since the 1956 political conventions, this film was introduced to the trade at the IPEX trade show held in Washington, D.C., in March, 1957. It seems to give best results with Kodak Developer DK-60a. A table of developing times ranging from 8 to 18 min. at 70° F. is given for use with a range of exposures equivalent to exposure indexes of 1600 to 8000. Developing solutions should be fresh, since a partially exhausted solution produces dichroic fog. Fixing times are about twice those for normal films, and an acid stop-bath is recommended. M.B.K.

Try Thin-Emulsion Films. A. Barney. *Pop. Phot.*, **40:** 64-5, 135-36, June, 1957. Thin-emulsion films produce sharp negatives that show little grain even when enlarged; they contain less silver than faster emulsions, and the individual particles within the emulsion are smaller than is conventional. Film of this type has a random scattering of light-sensitive silver halides suspended in a layer of animal gelatin which is coated onto an acetate support. It is suggested that the best results, i.e., maximum sharpness and finest grain, are obtained with these films when they are exposed a full stop less than the exposure recommended by the manufacturer, but are developed as specified. Thin-emulsion films described include Ilford Pan F, Perutz Perpantic-17 and Perpantic-18, Perutz Pergrano-14, Gevaert Microgram 27, Adox KB-17 and KB-14, and Kodak Panatomic-X. M.B.K.

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